

Vermont Brook Trout Conservation Strategies

Background

Brook trout are Vermont's only native stream-dwelling trout and are the most widely distributed trout species throughout the state. Brook trout are also a favorite of Vermont anglers. Statewide angler surveys conducted in 1991 and 2000 revealed it was the fish species most targeted by resident anglers and was their most preferred species for open-water fishing in Vermont.

Vermont's brook trout resource has had a remarkable history of abundance, devastation and recovery. Historical clearing of Vermont's forests, mill development and associated pollution were implicated in the statewide decline of brook trout by the late 1800s:

"...the depletion of our forests is connected with the disappearance of our brook trout"

"While the forests are being converted to lumber the streams are filled with sawdust and refuse destructive to fish life"

"After the forests are depleted the streams alternate between "violent and destructive torrents and dry beds of sand and boulders.""

"That the depletion of trout in Vermont is largely caused by the impurities thrown into the water, is also conceded"

(Twelfth Biennial Report of the Commissioners of Fish and Game of the State of Vermont, 1894)

By the 1950s, a statewide stream survey indicated Vermont's brook trout resource had substantially recovered as "*significant numbers of brook trout were taken from all watersheds,*" and "*a striking amount of natural reproduction*" was observed (MacMartin 1960). While physical habitat conditions were improving from the onset of reforestation, pollution from dairies, canneries, tanneries, paper mills, sawmills, granite sheds and slaughterhouses were still noted as significant threats. Although self-sustaining wild brown trout and rainbow trout populations were well established, it was primarily temperature that was believed to limit the distribution of brook trout at this time.

Today, brook trout are widely distributed throughout the state and found in every major watershed. Wild, self-sustaining populations are primarily relegated to small to mid-sized coldwater streams, and a few larger rivers, such as the Castleton River and Batten Kill, which have significant groundwater influence. It is the fish species most likely to be encountered in small upland streams, particularly at elevations exceeding 1000 feet, where it is often the only fish species inhabiting these waters. The Vermont Management Plan for Brook, Brown and Rainbow Trout (VDFW 1993) gives special recognition to these wild trout resources: "*Although environmental factors coupled with relatively short life cycles associated with these populations preclude most wild fish from attaining a large size, these streams are often sustaining populations near their maximum potential. These populations may represent Vermont's only native trout resource which has not*

been significantly altered by past management practices.” In a recent study, brook trout populations sampled in 62 sites representing 53 streams and 12 watersheds were characterized by abundant natural reproduction and multiple age-classes (Kirn 2001). On the contrary, wild populations of brook trout in standing waters are very limited in Vermont. High water temperatures and the widespread introduction of competing fish species, such as black bass and yellow perch, largely preclude management for wild brook trout in lakes and ponds.

Although the advent of environmental regulations since the 1970s has greatly improved water quality and physical habitats, there are still significant threats to the long-term survival of wild brook trout populations in Vermont. As water temperature is still the most critical factor in determining the distribution of brook trout populations, land-use practices that help maintain cool water temperatures are of the utmost importance. The preservation and restoration of streamside vegetation has been long recognized as extremely important for controlling temperatures by shading stream channels. Undisturbed, naturally vegetated buffer strips also promote stable streambanks, filter pollutants, provide food and shelter for fish and other aquatic organisms, and are sources of woody debris which creates aquatic habitat diversity and complexity in streams and ponds. These benefits are realized not only within the protected stream reach, but also in its downstream receiving waters. Other activities that promote wider stream channels (e.g. channelization, gravel removal, pond construction) or reduced streamflows may also contribute to increased water temperatures.

In addition to thermal impacts, sedimentation and instream habitat alterations are among the most serious threats facing Vermont’s wild brook trout stream populations. Artificial barriers to fish movement, such as culverts and dams, may also be of greater significance to these populations than previously believed. Although many early studies of brook trout in high elevation streams have indicated limited movements, recent work has illustrated potential biases in previous studies and documented significant migrations of this species.

Fisheries management practices may also have significant effects on wild brook trout resources, both positive and negative. Stocking artificially reared trout may be effective in maintaining recreational fisheries where adequate wild populations cannot be sustained due to physical or environmental habitat limitations. While the stocking of hatchery reared trout is an important fisheries management tool, this practice poses several risks to wild trout populations including direct competition, displacement, genetic alteration and the introduction of diseases.

Wild brook trout populations are particularly at risk from genetic interactions with stocked fish, as hatchery-reared trout need only survive a few months after stocking to spawn with wild stocks. Although cases of reproductive isolation have been observed in conjunction with long term stocking programs, introgression and hybridization between wild and hatchery stocks have been well documented for many salmonid species, including brook trout. Wide-spread stocking of brook trout since the late 1800s has raised questions regarding the origin of current-day brook trout populations, i.e. “do native populations

still exist?” Genetic testing of five brook trout populations from geographically distinct Vermont watersheds was conducted in 2006. Preliminary results indicate that these populations are genetically diverse, highly differentiated and show no evidence of influence from past stocking practices (T. King, USGS, personal communication). The existence of genetically distinct wild brook trout populations reinforces the need for a prudent approach to trout stocking.

The role of infectious diseases in fish populations is often poorly understood or underestimated, despite documentation of their contribution to significant mortalities in both cultured and wild populations. The potential consequences of disease introductions on fish populations include direct mortality, reduced performance (e.g. growth, survival, stamina), increased sensitivity to stressors and the creation of a reservoir of infection. The recent appearance of whirling disease to Vermont’s waters and Viral Hemorrhagic Septicemia (VHS) in nearby states raises serious concerns for wild brook trout resources.

The achievement of the following goals and strategies will be essential to sustain and enhance the long-term viability of Vermont’s wild brook trout populations and the recreational fisheries they support.

References:

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1 Priority 1: Habitat Protection

Short Term Goals

1.1 Protect brook trout habitats

- 1.1.1 Aggressively participate in state and federal environmental regulatory processes to protect brook trout habitats.
- 1.1.2 Develop and implement stream crossing guidelines that provide for unrestricted passage of brook trout and other aquatic organisms where appropriate.
- 1.1.3 Protect wild brook trout populations from the introduction of exotic and non-indigenous fishes, aquatic species and diseases that may adversely impact brook trout populations or their habitat.

Long Term Goals

1.2 Expand non-regulatory brook trout habitat protection efforts.

- 1.2.1 Work with state and federal departments and agencies to develop policies and practices that protect brook trout habitats.
- 1.2.2 Work with local governments to encourage sound land-use practices near waters of the state.
- 1.2.3 Encourage the development of in-state expertise in the design and construction of stream crossings that provide for unrestricted brook trout passage when appropriate.
- 1.2.4 Encourage the development of incentives for private landowners to maintain “healthy riparian zones.”
- 1.2.5 Identify and protect important riparian habitats along waters supporting wild brook trout, via purchase, easement, or formal agreements.

2 Priority 2: Brook trout protection, restoration and enhancement

Short Term Goals

2.1 Restore or enhance brook trout populations

- 2.1.1 Use biological and habitat evaluations to identify and pursue opportunities for brook trout habitat enhancement projects.
- 2.1.2 Identify and resolve factors that limit the effective use of existing funding sources to implement brook trout habitat enhancement projects
- 2.1.3 Identify ponds with the potential for wild brook trout management and develop implementation strategies.

2.2 Minimize potential impacts of cultured trout on wild populations through prudent management of cultured trout strains, diseases, stocking densities and species introductions.

- 2.2.1 Manage small upland streams supporting naturally reproducing populations of brook trout as wild trout waters (i.e. no stocking), unless *specific* evaluations indicate the stocking of cultured trout is justified. These waters will often support moderate to dense populations of wild brook trout and are unlikely to attract high enough fishing pressure to warrant stocking.
- 2.2.2 Minimize potential impacts of serious fish diseases upon cultured and wild trout stocks through continued management of a statewide fish health program.
- 2.2.3 Evaluate the use of sterile triploid and all-female triploid brook trout to minimize genetic risks to nearby wild populations, where the use of cultured fish is justified to meet recreational needs.
- 2.2.4 Evaluate the use of sterile triploid and all-female triploid rainbow trout and brown trout to minimize the risk of establishing competing populations, where the use of cultured fish is justified to meet recreational needs.
- 2.2.5 Investigate the need for regulations or statutes to restrict private stocking of waters designated for wild trout management.

Long Term Goals

2.3 Encourage the prioritization of enhancement projects by need (from brook trout population and habitat assessments), the magnitude of impact (amount of habitat improved or access gained), and the likelihood of success.

- 2.3.1 Use biological and stream crossing inventories to develop a process for identifying fish passage enhancement priorities.
- 2.3.2 Use quantitative fish habitat and channel geomorphic surveys to monitor and evaluate long-term trends of brook trout habitat.

3 Priority 3: Recreational Fishing

Short Term Goals

3.1 Identify, promote and maintain recreational fishing opportunities for wild brook trout.

- 3.1.1 Provide information on the status and location of wild brook trout resources.
- 3.1.2 Maintain and enhance access to recreational fishing opportunities to waters supporting wild brook trout, via purchase, easement, or formal agreements.

Long Term Goals

3.2 Manage wild brook trout populations for long-term sustainability

- 3.2.1 Evaluate and apply appropriate angler harvest regulations to conserve/enhance trout population levels and/or size structure.

4 Priority 4: Outreach

Short Term Goals

4.1 Promote the public's understanding of the status of wild brook trout in Vermont, their habitat needs and current threats to their populations.

- 4.1.1** Complete a "Vermont wild brook trout poster" for general distribution.
- 4.1.2** Disseminate information to the general public via various media outlets (web, news releases, brochures, etc.) stressing the importance of habitat to the conservation of wild brook trout populations in Vermont, the public's responsibility and role toward protecting and enhancing this important resource and the potential threats of exotic species and disease introductions and expansions within Vermont.

Long Term Goals

4.2 Improve access to wild brook trout distribution information.

- 4.2.1** Create a GIS layer on the distribution and status of wild brook trout resources.
- 4.2.2** Develop age-appropriate support materials for teachers on brook trout life history, distribution, habitat needs and threats.

5 Priority 5: Assessment

Short Term Goals

5.1 Monitor current brook trout populations

- 5.1.1** Continue long-term monitoring of specific brook trout streams to better understand population dynamics in response to environmental and land-use factors.
- 5.1.2** Identify information gaps and conduct quantitative fisheries assessments to identify the distribution and status of wild brook trout populations.

Long Term Goals

5.2 Evaluate long-term population trends and identify influences of past management practices on wild brook trout populations.

- 5.2.1** Repeat the statewide assessment of wild brook trout populations comparing population levels from the 1950s and 1990s.
- 5.2.2** Evaluate the need for additional genetic assessments for Vermont wild brook trout waters. Identify specific goals and objectives for genetic assessment.